Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the above-referenced application.

1. (**Canceled**)

2. (**Currently Amended**) A method for site-specific incorporation of acyclonucleotides into DNA comprising:

reacting an archaeon Family B DNA polymerase with a primed DNA template and a nucleotide solution containing at least one acyclonucleotide to produce fragments of DNA with the acyclonucleotide covalently attached to the 3' terminal residue;

wherein the DNA polymerase is encoded by an isolated DNA fragment that hybridizes in a Southern blot to an isolated DNA fragment selected from the group consisting of a DNA fragment having nucleotides 1-1274 of SEQ ID NO:4, a DNA fragment having nucleotides 291-1772 of SEQ ID NO:4, a DNA fragment having nucleotides 4704-5396 of SEQ ID NO:4, and a DNA fragment having nucleotides 4718-5437 of SEQ ID NO:4, wherein hybridization is conducted under the following conditions: a) hybridization: 0.75 NaCl, 0.15 M Tris, 10 mM EDTA, 0.1% sodium pyrophosphate, 0.1% sodium lauryl sulfate, 0.03% BSA, 0.03% Ficoll 400, 0.03% PVP and 100 µg/ml boiled calf thymus DNA at 50°C for about 12 hours and; b) wash: 3X30 minutes with 0.1X SET, 0.1% SDS, 0.1% sodium pyrophosphate and 0.1 M phosphate buffer at 45°C;

and further wherein the DNA polymerase is capable of incorporating the at least one acyclonucleotide to produce the fragments of DNA.

3. (**Currently Amended**) A method for site-specific incorporation of acyclonucleotides into DNA, comprising:

reacting an archaeon Family B DNA polymerase with a primed DNA template and a nucleotide solution containing at least one acyclonucleotide to produce fragments of DNA with the acyclonucleotide covalently attached to the 3' terminal residue;

wherein the DNA polymerase has at least 30% primary amino acid sequence identity with Vent DNA polymerase;

and further wherein the DNA polymerase is capable of incorporating the at least one acyclonucleotide to produce the fragments of DNA.

4. (**Previously Presented**) The method of claims 2 or 3 wherein the acyclonucleotide comprises a detection reagent.

5-12. (**Canceled**)

13. (**Previously Presented**) The method of claim 2, wherein the DNA polymerase is selected from the group consisting of Vent, Deep Vent, Pfu and 9°N DNA polymerases.

14. (**Previously Presented**) The method of claim 2 or 3, wherein the DNA polymerase has been mutated by substitution of an amino acid residue at a site corresponding to A488, L492, A493 or Y499 in Vent polymerase.

15. (**Previously Presented**) The method of claim 2 or 3, wherein the DNA polymerase has been mutated by substitution of an amino acid residue corresponding A488 in to Vent polymerase with L, I, V, F, S or C.

16. (**Previously Presented**) The method of claim 2 or 3, wherein the DNA polymerase has been mutated by substitution of an amino acid residue corresponding A488 in Vent DNA polymerase with L.

17. (**Previously Presented**) The method of claim 2 or 3, wherein the DNA polymerase has been mutated by substitution of an amino acid residue corresponding Y499 in Vent DNA polymerase with L.

18. (**Previously Presented**) The method of claim 2 or 3, wherein the DNA polymerase is a mutant selected from the group consisting of Vent (A488L), Vent (Y499L) and 9°N (A485L) DNA polymerases.

19. (**Previously Presented**) The method of claim 2 or 3 wherein the acyclonucleotide is incorporated to an extent greater than that of a corresponding dideoxynucleotide.

20. (**Previously Presented**) The method of claim 2 or 3 wherein the acyclonucleotide is incorporated to an extent of at least, approximately, two-fold greater than incorporation of a corresponding dideoxynucleotide.

21. (**Currently Amended**) The method of claim 2 or 3 wherein the acyclonucleotide is incorporated to an extent of at least, approximately, five-fold greater than incorporation of ~~the~~ a corresponding dideoxynucleotide.

22. (**Currently Amended**) The method of claim 2 or 3 wherein the acyclonucleotide is incorporated to an extent of at least, approximately, nine-fold greater than incorporation of ~~the~~ a corresponding dideoxynucleotide.

23-26. (**Canceled**)

27. (**Previously Presented**) The method of claim 2 wherein the DNA polymerase is thermostable.

28. (**Previously Presented**) The method of claim 2 wherein the DNA polymerase has no detectable exonuclease activity.

29. (**Previously Presented**) The method of claim 3 wherein the DNA polymerase has an exonuclease activity of less than about 5% of Vent polymerase.

30. (**Previously Presented**) The method of claim 3 wherein the DNA polymerase has an exonuclease activity of less than about 25% of Vent polymerase.

31. (**Previously Presented**) The method of claim 2 further comprising the step of employing the resulting sequence-specific termination product or products in DNA sequence determination.